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Thermoresponsive Polymers and Block Copolymers in Ionic Liquids HAU-NAN LEE, University of Minnesota, ZHIFENG BAI, NAKISHA NEWELL, TIMOTHY LODGE — We recently discovered that poly(ethylene oxide) (PEO) and poly(n-butyl methacrylate) (PnBMA) exhibit two completely different types of lower critical solution temperature (LCST) phase behavior in certain ionic liquids (ILs). While typical LCST type phase diagrams were shown in PnBMA/IL systems, we observed unusual temperature-composition phase diagrams in the PEO/IL systems, in which the cloud point curves are strongly asymmetric, with the critical composition located at 80 wt % of PEO. In addition, an important feature of these thermosensitive polymer/IL systems is that the LCST can be easily tuned over a wide range by blending different ILs, without changing the chemical structure of the polymers. On the basis of the LCST of PEO and the upper critical solution temperature (UCST) of poly(N-isopropylacrylamide) (PNIPAm) in ILs, we designed a PEO-PNIPAm block copolymer that exhibits interesting doubly thermosensitive self-assembly. The block copolymer forms PNIPAm-core micelles at low temperatures and transforms into PEO-core micelles at high temperatures. The critical micellization temperatures (CMT) of both blocks can be manipulated by adjusting the mixing ratio of ILs.

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